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Zero Retries is an independent newsletter promoting technological innovation that is occurring in Amateur Radio, and Amateur Radio as (literally) a license to experiment with and learn about radio technology. Radios are computers - with antennas! Now in its fourth year of publication, with 2200+ subscribers.

About Zero Retries

Steve Stroh N8GNJ, Editor

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In this issue:

- **Request To Send**
    - **Paid Subscribers Update**
    - **Rough Week… Leading to a Rough Rest of Decade**
- **Disintermediation In Amateur Radio**
- **220 MHz Amplifier Suitable for Use with Software Defined Transmitters**
- **ZR > BEACON**
    - **Amateur Television - in a 100 kHz Channel?**
    - **International Space Station (ISS) Slow Scan TV (SSTV) Experiment 2024-11-18 thru 24**
    - **Reliably Differentiating Between Two (or More) USB Audio Interfaces on the Same Computer**
    - **Fall 2024 Husky Satellite Lab (HSL) Update**
    - **Pioneering the Future with Wi-Fi 8**
    - **APRS Local Info Initiative**
    - **Open Research Institute (ORI) Inner Circle Newsletter: Autumn 2024**
    - **Surrey Amateur Radio Communications Communicator Newsletterzine - November - December 2024**
- **Join the *Fun* on Amateur Radio**
- **Closing The Channel**
- **Footnotes for this Issue**
- **Comments for This Issue** (redirect to Comments page)

Web version of this issue - https://www.zeroretries.org/p/zero-retries-0177

Request To Send

Commentary by Editor Steve Stroh N8GNJ

Paid Subscribers Update

My thanks to **Edward Mitchell KF7VY** for *renewing* as an **Annual Paid Subscriber** to Zero Retries this past week!

My thanks to **Prefers to Remain Anonymous 17** for *renewing* as an **Annual Paid Subscriber** to Zero Retries this past week!

Financial support from Zero Retries readers is a significant vote of support for the continued publication of Zero Retries.

Rough Week… Leading to a Rough Rest of Decade

It's been an intense week for those of us in the US with our various national elections. I can't think of a Zero Retries angle to discuss the new US political realities, so I won't.

However, looking ahead, regardless of our individual political leanings, I speculate that Amateur Radio will be impacted by change of administrations, and a change of perspective about radio technology within the US government.

- The FCC will be changed because the makeup of the FCC is traditionally two Democrat commissioners, two Republican commissioners, and the FCC Chair is chosen by the current administration1. The current FCC has been "consumer leaning", implementing many reforms, including Docket 16-239, the major change in the Amateur Radio HF bands in eliminating descriptions of data modes and enacting a 2.8 kHz maximum bandwidth for data modes. When that change was enacted, the FCC requested comments about whether similar changes should be enacted on the Amateur Radio VHF / UHF bands and the majority of the responses were favorable for doing so. There's no timetable for this "Part 2" of Docket 16-239 to be completed, and I fear that the FCC will be so busy in the new administration, revising many policies of the previous administration, that we may well never see the completion of the 16-239 changes for VHF / UHF.

- Another change I fear from the FCC is that the new administration may well be much more receptive to changes proposed by NextNav for the 902-928 MHz band in FCC Docket 24-240. If NextNav's Docket 24-240 proposal is enacted, NextNav has made a business case and has promised (?) massive investment in new radio technology infrastructure, and revenue for their proprietary services. Amateur Radio being a secondary priority in this reconfiguration of 902-928 MHz may find the band effectively unusable, especially for traditional analog FM repeaters.

- A primary promise of the new administration is that significant new tariffs will be imposed on imported goods from China. I'll guess that one of the primary effects of this new policy will be that inexpensive electronic units, especially semi-customized units won't be nearly as inexpensive, or as available, as they have been in the past. If you're thinking of buying a radio or other unit made in China, particularly those sold direct by Chinese manufacturers, I suggest buying it now.

- One tiny, potential improvement from the change of administration *might* be (and admittedly, this is a stretch) an increase in radio technology that is not just designed in the US, but perhaps *manufactured* in the US, similar to what happened when Chinese vendors such as Huawei were disallowed for use in US telecom infrastructure, which created more business for other vendors. This isn't a *total* stretch… both FlexRadio and Elecraft manufacture their high end HF radios here in the US. Alternatively, Chinese electronics manufacturers might follow the example of Chinese manufacturers of battery electric vehicles proposing to build manufacturing plants in Mexico to take advantage of the (currently in force) North

American Free Trade Agreement (NAFTA). That said, the US / Mexico relationship, and NAFTA, may well be due for a shakeup from the new administration.

But mostly, I fear that in this new administration, radio technology businesses of all kinds will be emboldened to make the argument, as NextNav just did for the 902-928 MHz band, that Amateur Radio and other non-primary users of various bands, should be subject to being downsized / de-prioritized, or simply de-allocated in favor of speculative new radio services in the name of national security or simply potentially profitable new services. For example, if Amateur Radio can effectively share 420-450 MHz with various US government services, likely a well-funded new commercial service could make the case that they could operate in 420-450 MHz as effectively as Amateur Radio does now.

Thus, there has never been as strong an imperative as there will be in the rest of this decade to *use our Amateur Radio VHF / UHF spectrum more fully*, and demonstrate and document that usage. If we don't, we could quite possibly have it reallocated for "higher and better" commercial usage. Many will say that this is scaremongering, and Amateur Radio has lived with such threats for many decades now.

To that stance, I posit that the situation *really **is** different now*. One prominent example of how different the situation is - in the era of *Instant Broadband Connectivity, Nearly Everywhere, via Starlink*, I posit that Amateur Radio's role in emergency communications is increasingly diminished in favor of those who can show up with a Starlink user terminal (especially the highly portable Starlink Mini), power it, and configure its Wi-Fi or plug into its Ethernet port, to provide *direct Broadband Internet* in emergency situations. Thus Amateur Radio needs a better justification, or at least better *usage* of its various VHF / UHF bands, to justify its continued usage of those bands.

One way to do so is to embark on a broad, and rapid campaign to revitalize FM repeaters, and significantly increase the usage of those repeaters, by equipping them with Multi Mode Digital Voice Modems (MMDVMs) which will enable those repeaters to not only be compatible with all Digital Voice modes, but also data capability using the new MMDVM-TNC data modes. For more detail on MMDVM-TNC, see **Zero Retries 0175** - MMDVM-TNC is (Kind of) Real. That US Amateur Radio has built a strong network of VHF / UHF repeaters nationwide is a little-recognized "superpower" of Amateur Radio, and that capability will be considerably strengthened if data via repeater capabilities become widely available.

Another is Amateur Radio's increasingly tenuous allocations at 1.2 GHz, 2.3 / 2.4 GHz, 5.4 GHz, and 10 GHz. We know very well how to build "repeater" systems for these bands because we've done so on various satellites, and a few very technically capable Amateur Radio clubs have put up systems on these bands on mountains. But that knowledge is specialized and hard to find (not widely shared - try to find a good explanatory article about "groundsats"), and especially hard to replicate. There is *potential* (however tenuous) for additional satellite payloads, or perhaps even small dedicated satellites, in geosynchronous orbit over the Americas for use by Amateur Radio and using the 2.3, 5.4, and 10 GHz bands. If we don't do so soon… we may lose the ability to do so at all because of minimal usage of these bands invites commercial sharing at best, reallocation at worst.

This newest, more urgent *get organized for using it so we don't lose it* activity may well sound like a primary activity / justification for large, established organizations that, in theory, could organize such work. But there hasn't been much progress on these issues by the larger, existing organizations. There is no "American (or North American) Repeater Association" that coordinates repeaters on a national / continental basis, or helps to create new repeaters, or provides standards for repeater capabilities, or recommends new technical capabilities such as MMDVM retrofits, etc. And, at the moment, there's no noticeable activity occurring *in* North America for an Amateur Radio GEO payload / satellite; what activity there is are proposals for such a capability by the *European* Space Agency.

But in reality, existing, larger organizations *haven't* demonstrated much progress. Thus… the pressure (impatience) for *disintermediation* of those organizations, and their traditional roles and functions, is growing - see the following article.

Have a great weekend, all of you co-conspirators in Zero Retries Interesting Amateur Radio activities!

Steve N8GNJ

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Disintermediation In Amateur Radio

By Steve Stroh N8GNJ

This article is admittedly going to discuss a very particular (and probably singular), wonky, abstract, big picture of Amateur Radio from my perspective. If your interests in Amateur Radio are "just having fun", or one particular or a handful of specific modes of Amateur Radio, feel free to skip this discussion.

In Zero Retries, I've struggled to offer a "unified" explanation of what I've been observing with the growing technological innovation in Amateur Radio, and the simultaneous decline of influence and relevance of various organizations centered in Amateur Radio. In my earliest compositions of this article I called it the "atomization" of Amateur Radio, but with the help of my late friend Dewayne Hendricks WA8DZP, I finally discovered a good framework for the explanation - **disintermediation**.

In the aftermath of WA8DZP's death, an acquaintance of his mentioned this brief YouTube video:

In which WA8DZP referenced *this* video:

Neither video directly references Amateur Radio…

Update *- My thanks to Malcolm Hendricks (see the comments) for watching the entire Moglen video and offered this correction:*

> *Dewayne Hendricks does in fact mention amateur radio in the Q&A section of Eben Moglen's speech when he makes an appearance at 1:18:17. "With the license class I have, I can put a communications platform in orbit without asking the FCC for permission. That is powerful.*

… but they're both relevant, at least in my Zero Retries big picture perspective where Amateur Radio in the 2020s and beyond is a proving ground for radio technology innovation by techies, because our Amateur Radio licenses are literally a license to experiment with and learn about radio technology.

Wikipedia:

> **Disintermediation** is the removal of intermediaries in economics from a supply chain, or "cutting out the middlemen" in connection with a transaction or a series of transactions. Instead of going through traditional distribution channels, which had some type of intermediary (such as a distributor, wholesaler, broker, or agent), companies may now deal with customers directly, for example via the Internet.

Eben Moglen's discussion is almost entirely about the wrenching changes to society, businesses, institutions, and individuals brought about by widely available broadband Internet access. But as / if you listen to Moglen, you may see some parallels with what's happening in Amateur Radio, as I did. As a key advisor about Zero Retries and Amateur Radio reminds me often, Amateur Radio isn't apart from society, it's a microcosm, so we shouldn't expect Amateur Radio to be better, or worse, or immune from societal trends. And with that understanding, a lot of what is happening in Amateur Radio begins to make more sense, or at minimum, easier to understand, and place into context.

In the macro view of Amateur Radio, it could be thought of as alarming that a major (for Amateur Radio) manufacturer, MFJ Enterprises, announced that it's winding down its business. Another alarming development in Amateur Radio is CQ Magazine ceasing publication. A third major "alarm" is what I'll just lump together as "longstanding Amateur Radio organizations" not really understanding their roles in the 21st century.

But allow me several counter-examples of all of those developments.

MFJ Disintermediated by N7EBB

Earlier this year, my friend Randy Robinson N7EBB became involved in the DigiPi project and conceived the idea of creating a simple printed circuit board that could make it easier to begin using DigiPi. So he built prototypes and tested them, and when he was asked to make them available for local friends, and then other folks, N7EBB ordered a quantity of printed circuit boards and components, built a simple e-commerce web site, and began selling his Radio Interface Board online. Unlike the typical scenario in the 20th century, N7EBB didn't need to sell his idea to MFJ, or engage Ham Radio Outlet or other retailers to get his product into the hands of interested Amateur Radio Operators. He doesn't even need to advertise his Radio Interface Board as it was well publicized on the YouTube channel KM6LYW Radio. It's likely that anyone interested in building a DigiPi system will quickly become aware of N7EBB's Radio Interface Board as a simple and inexpensive option to build a DigiPi - disintermediation in action.

CQ Magazine Disintermediated by SARC Communicator

Surrey Amateur Radio Communications is an Amateur Radio club in Surrey (Vancouver) British Columbia, Canada that publishes a bimonthly "newsletterzine" called **The Communicator**. It's free, it's distributed entirely online using Google Drive, and since I encountered it, it's routinely been 100+ pages. The November / December 2024 issue is 130 pages. It's written, edited, and published entirely by volunteers, and I'll guess that bimonthly publication is a sustainable schedule that it's not onerous for the volunteer writers and editors. There are a few sponsors, but The Communicator hasn't yet been discovered by the usual Amateur Radio advertisers, or perhaps SARC's publishing "staff" has declined such offers of advertising[2]. In my mind, the SARC Communicator is equal to the reading pleasure and overall information content of CQ Magazine (the contest reporting was never of any interest to me)… other than CQ published my friend Don Rotolo N2IRZ's bimonthly Digital Connection column[3], and I really miss reading N2IRZ's material.

TAPR Disintermediated by APRS Foundation and Open Research Institute

The Amateur Radio Automatic Packet Reporting System - APRS system was created by the late Bob Bruninga WB4APR, but (at least in my opinion), APRS was largely "incubated" by TAPR. TAPR's aprssig email list was the de facto worldwide online community for APRS, and major developments in APRS were hashed out in person and formal papers presented at TAPR Digital Communications Conferences, at TAPR's forums held at the annual Hamvention conference, and developments documented in TAPR's quarterly Packet Status Register newsletter.

In 2024, many of those roles relevant to the promotion and development and support of APRS[4] have, or are in the process of being assumed by the newly formed APRS Foundation, which is hyper focused on supporting, promoting, and expanding APRS.

In late 2024, Open Research Institute began a project to eventually petition the US FCC to revamp the regulations for Amateur Radio's secondary use of the 219-220 MHz band. This sort of technology-based regulatory reform was most recently coordinated by TAPR, but it has been decades now since TAPR has undertaken such work.

These two projects - APRS Foundation "taking charge of the future of APRS" and Open Research Institute's "petition the FCC to allow real usage of 219-220 MHz" are examples that larger or well-established organizations like TAPR are no longer necessary to effect change in the 2020s and beyond. All of the necessary tools for organizing and effecting change are available to small groups. Websites, email lists (and other electronic community systems), and especially easy ways to collect fundraising, dues, donations, conference fees, and other financial contributions are widely available and easy to use and affordable (by payment of a small percentage of monies collected). APRS Foundation and Open Research Institute are effectively disintermediation of larger or longer established organizations such as TAPR.

Proprietary Digital Voice Disintermediated by (Open Source) M17 Project for VHF / UHF and FreeDV on HF

It's hard to see it at the moment, with the vast numbers of proprietary digital voice radios5 and repeaters already in use in Amateur Radio VHF / UHF bands, but given the "*cheap* radios are popular" trend in Amateur Radio, and that M17 is easily and inexpensively implemented within a conventional Amateur Radio, such as demonstrated in implemented by OpenRTX, it seems quite *possible* at a minimum, and eventually *likely*, that M17 will become more widespread. And, instead of buying expensive, proprietary, "one digital mode plus (maybe) FM" repeaters, FM repeaters can be easily retrofitted with MMDVM modems to expand their capabilities to accommodate *all* digital voice modes, *including* M17. One interesting new development with M17 is the ability to incorporate digital signatures into an M17 transmission, thus being able to authenticate the source of a transmission in band (no external authentication system needed). Another reason to prefer M17 is the ability to act as a data modem to transmit data seamlessly with digital voice; data capability is (in my opinion) implemented poorly in all the other digital voice systems used in Amateur Radio.

FreeDV is a robust digital voice mode specifically designed for HF. FreeDV isn't dependent on any specific (modem) hardware - it's implemented entirely in (portable) software that can be incorporated *into* a radio. For example, earlier versions of FlexRadio's SmartSDR "radio operating system" could load an earlier version of FreeDV, but newer versions of SmartSDR cannot do so, and FlexRadio units earlier than the newest 8000 series no longer have enough available processing power or code space or ??? to run applications like FreeDV *in* the radio. For use with existing radios (that don't offer the ability to run third party software in the radio, FreeDV has been implemented in a hardware unit - the ezDV. Like with M17, the current numbers of FreeDV users are small, but given that FreeDV is free software, it seems likely that newer HF radio manufacturers hoping to differentiate their products from more established manufacturers with more expensive products will begin to incorporate FreeDV. And, like M17, FreeDV was born in the data-mostly era, and thus has the potential for an integral, or at least a companion data mode in FreeDATA.

Once You Understand Disintermediation…

Disintermediation is one of those things that once you understand it, you see it everywhere. Here are a few more examples occurring in, and adjacent to Amateur Radio:

- The *many, and widely varied* YouTube channels that discuss Amateur Radio. While many of them aren't that great, some are pretty good, and serve a valuable, unique role. The best of these YouTube channels disintermediate existing Amateur Radio media by Amateur Radio Operators with various experiences and expertise speaking directly to other Amateur Radio Operators that want to learn what the YouTube creators are willing to explain.

- This newsletter Zero Retries was a reaction to the dearth of "Zero Retries Interesting" material in Amateur Radio media. It was enabled by new newsletter publishing tools such as the Substack and Ghost email publishing platforms. Instead of petitioning other publications to publish more Zero Retries Interesting material, including material that I write, Substack (and soon, Ghost) allows me an independent publication channel, a disintermediation of magazines such as QST, CQ, RadCom, etc.

- Since TAPR has apparently relinquished the long-running Digital Communications Conference (DCC), it's feasible to imagine an new, independent organization that is hyper focused on conducting a multi-day in-person conference that rotates around North America (or perhaps even overseas) like the DCC (speculative title - Amateur Radio Technological Innovation Conference - ARTIC). It was pointed out that there are other digital conferences including the Utah DCC, and the MicroHAMS Digital Conference here in the Seattle, Washington area. I'll write more on this subject in future issues of Zero Retries.

- Another Amateur Radio conference disintermediation is Ham Radio Village which "takes Amateur Radio *to* technical conferences such as DEFCON" to showcase Amateur Radio, provide presentations, and often conduct Amateur Radio Volunteer Examiner testing sessions to obtain an Amateur Radio license. Ham Radio Village disintermediates traditional Amateur Radio conferences by "going direct to the techies" instead of hoping that techies interested in radio technology will find their way to Amateur Radio and

become licensed.

- Radio Amateur Training Planning and Activities Committee - RATPAC is an excellent series of online presentations on a wide variety of Amateur Radio topics, that are presented live online and provided as archived videos. RATPAC disintermediates the seminars at Amateur Radio conferences with universally available videoconferences on a regular schedule, and offers those videos as online archives.

- Amateur Radio space organizations are being disintermediated by newer, independent organizations such as Libre Space Foundation (which incubates *many* interesting, engaging projects including SatNOGS and UPSat), and TinyGS. I have no idea whether AMSAT-CA (Canada) will become real; it's been more than one year since it was announced, but its formation and potential, and the earlier separation of Amateur Radio on the International Space Station (ARISS) from AMSAT-NA is disintermediation of AMSAT-NA's traditional roles in Amateur Radio satellite building and operation and support.

- *Disclaimer - In this example, I am not a proxy for ARDC; these opinions are solely my own.*
  In my opinion, Amateur Radio Digital Communications (ARDC) is disintermediating various aspects of ARRL's previous roles in Amateur Radio such as sponsoring scholarships, grants to clubs for various expensive projects (that clubs can't quite fund entirely with their own resources), sponsoring research and development to materially improve Amateur Radio's capabilities, and co-sponsoring (including financially) technical conferences. While ARDC is working currently working with ARRL on some projects such as scholarships and grants to clubs, in such arrangements ARRL is acting as a classic middleman. Thus there are cost efficiencies… disintermediation… to be gained from "going direct" as ARDC builds up its capabilities to manage additional volunteer committees. During my time with ARDC on the Grants Advisory Committee, ARDC simply didn't have the ability to "vet" direct applications for scholarships, but just as ARDC has created an increasing number of volunteer committees and has learned how to manage those, it's conceivable that ARDC could build up additional committees to evaluate scholarships, club projects, and major R&D projects and no longer involve ARRL.

- APRS in Amateur Radio could conceivably be disintermediated by CATS - Communication And Telemetry System. CATS is designed the 21st century with an extensible framework, with newer technology that wasn't available when APRS was created in the 1980s. APRS in Amateur Radio is also being disintermediated by the use of APRS on LoRa hardware operating on license-exempt spectrum.

- The use of data communications on Amateur Radio VHF / UHF bands is being disintermediated by LoRa, an inexpensive implementation of Chirp Spread Spectrum, designed for use in license-exempt spectrum - 433 MHz and 868 MHz in Europe, and in 902-928 MHz in North America. Hobbyists and individuals and small groups wanting to have independent text messaging capability amongst themselves have embraced Meshtastic, which uses inexpensive LoRa units and apps on smartphones for data communications. Meshtastic is even being used for implementing a radio-based Bulletin Board System.

Some will mourn the effects of disintermediation, but it's an unstoppable trend. We're in the Internet era now, and the tools to empower individuals and small groups are more available, and capable, than we could have ever imagined in the 20th century. Many of us are no longer willing to passively consume what existing organizations deign to provide, be it products, information (or the dearth of it), or the status quo of Amateur Radio regulations. We individuals and small groups in Amateur Radio have the capability to self-organize, and increasingly we're taking full advantage of those capabilities.

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220 MHz Amplifier Suitable for Use with Software Defined Transmitters

By Steve Stroh N8GNJ

One of the issues identified in the recent activity led by Open Research Institute (ORI) about the Amateur Radio

*allocation at 219-220 MHz (see **Zero Retries 0176** - Revisiting the US Amateur Radio 219-220 MHz Band) is the lack of data radios that can operate in 219-220 MHz.*

One argument against using a typical Amateur Radio 220 MHz "data" radio such as the BridgeCom Systems BCM-220 is the wider channels (100 kHz) available for Amateur Radio use in 219-220 MHz. If we're going to try to "change the paradigm" in 219-220 MHz, in my opinion, we should try to "go big" with a wide bandwidth / higher speed data radio. Such a radio is likely feasible with a Software Defined Transceiver.

But… while various Software Defined Transceivers can easily be tuned to 219-220 MHz, the transmit power of such units is very low. Thus a suitable driver / power amplifier is needed to make the use of Software Defined Transceivers *practical*.

At my request, after I explained the potential new Amateur Radio use case of 219-220 MHz, Jim Andrews KH6HTV researched the feasibility of building 220 MHz versions of his existing 440 MHz power amplifier products:

- Model 70-7B - 20 / 10 / 3 Watt
- Model 70-9B - 70 / 25 / 10 Watt

Per KH6HTV, not only were these proposed new 220 MHz amplifiers *feasible **(Yay!)***, his pricing of these proposed new 220 MHz amplifiers would be very similar to the price of the 440 MHz amplifiers on which the 220 MHz amplifiers would be based.

The primary feature of KH6HTV's amplifiers is that unlike typical Amateur Radio VHF / UHF power amplifiers that require drive input of several watts (typically designed to amplify signals from portable radios), KH6HTV's amplifiers can be driven to full power output from a very low power drive input, including the very low power levels of Software Defined Transmitters. That feature is because KH6HTV designed his amplifiers for use with the very low power drive inputs from commercial video equipment for use with Amateur Television.

Disclaimer - To date, KH6HTV has not yet built these proposed 220 MHz amplifiers, but he will do so upon the placement of a prepaid order for such a unit. KH6HTV estimates the procurement of components and manufacturing lead time to be approximately one month.

Considering that he has not built such a unit yet, KH6HTV's offer of equivalent cost for this (adapted) design based on his mature 440 MHz amplifiers seems more than reasonable to me. Perhaps ORI or other organization with access to R&D funds could fund the construction of a pair of KH6HTV 220 MHz amplifiers for (bench) evaluation of operation on 219-220 MHz.

One caveat of KH6HTV's amplifiers is that they are *transmit power amplifiers* (not bidirectional) and thus not suitable for use with a Software Defined Transceiver that has only one antenna port that is switched between transmit and receive. KH6HTV's amplifiers do not provide a "receive path". This won't be an issue for use with, as an example, a LimeSDR Mini 2.0 which has separate antenna ports for transmit and receive.

Fortunately, there are now many options for Software Defined *Receivers* that are capable and inexpensive. Thus pairing a Software Defined Transceiver with a Software Defined Receiver likely would not be much of an issue.

My thanks to Jim Andrews KH6HTV for being willing to consider building these customized power amplifiers for 220 MHz. In my opinion, with those amplifiers, KH6HTV just made it feasible to seriously consider experimentation, perhaps requesting an FCC Special Temporary Authority (STA), and at least some attempts at *actually using the Amateur Radio allocation* at 219-220 MHz.

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ZR > BEACON

By Steve Stroh N8GNJ

Short mentions of Zero Retries Interesting items.

Amateur Television - in a 100 kHz Channel?

I only recently became aware of this project from a mention in the excellent, and frequently published ATV Journal by Jim Andrews KH6HTV.

The earliest mention / explanation of this project that I've found was in (what is now called) ATV Journal Issue 114 published in November, 2022:

> Recently, there has been a flurry of activity, mainly triggered by a discussion of ultra-narrow bandwidth ATV for use on the upper HF band of 10 meters. Not SSTV with single images, but "live" video. It was triggered off by Grant, VE3XTV. The following are some of the postings and replies. To read the complete, on-going string, go to the web site.
>
> **ATV on 10 meters ?**
>
> Grant, VE3XTV, North York, Ontario writes that he has been working on a new NBTV, 90 line system that could be transmitted on the 10m or 6m bands, as a way to do ATV over longer distances.
>
> …
>
> Hi All -- Who would interested in working with NBTV? I working on a new 90 line system, as it seems impossible to find anyone locally that would be interested in doing ATV / DATV here in Toronto. Therefore I am working on a possible new long distance form of ATV that would be usable via Sky-wave, it will be using analog video processing and a new type of RF modulation. In many ways going back to basics of Television and taking a very new approach to get this idea to work. Where the only part that will be digital will be the Digital Signal Processing (DSP), I am using to process the video for the RF modulator and the de-modulator stage, as this is a return to technology used with ATV, to get around the limitations with digital modulation. This is very much a hardware project and for those who would be looking a software application to download will be out luck, as I need optimize this technology to maximize the spectrum efficiency.
>
> Grant Taylor, VE3XTV, North York, Ontario, Canada

VE3XTV continues to develop this concept. From the DigitalATV email list:

> Over the last week I have been working on the GNU Radio modulator and demodulator layouts using the hybrid NBTV format as it shown to have a few advantages over the all digital system. But still do not have the required processing power needed with my i7 PC, on loop back testing I have fix an issue with the filter delays and the impact on the multiplexers, with getting the recovered data. With noise tests between the digital and hybrid system, the 1/2 FEC was only any good when the picture was above the P4 level, then digital would cutout at this point. Which is no good when working with sky-wave propagation, this is why I have moved back doing analog signal processing to keep TV picture in lock even through the fades. The main issues with the all digital system is the 16PSK, as I need drop down to QPSK or BPSK to get down to the P2 level of the hybrid system. To do this within 100kHz is near impossible at this stage, as it would need to up the required bandwidth to around 500 kHz to meet these signal to noise improvements.
>
> For now we are locked into the hybrid system with different modes available, getting down below 100kHz of bandwidth, unless anyone has any new ideas on how this could be done? I tried a few different approaches and to get the signal levels anywhere near what I would consider usable is a

> long way off.
>
> Today I have install Zoom on both workshop computers, my plan is now to do demonstrations of this technology, highlighting what can be done with NBTV and SDR, for those who are interested in doing something new within ATV. It seems there is still large number of ATVers locked in some form of Windows OS and therefore I may need to cover more about upgrading to Linux, as the support for Windows 10 is running out. As I am not sure how well this NBTV software would work using a Linux VM setup within Widows 10 or 11, this would mean even less processing power would available to work with.

This is a remarkable concept and project. If achieved, this will be a 10x reduction in bandwidth needed for full motion video beyond the current practice in Amateur Radio of using Digital Television technology using a 1 MHz channel. Not to mention the ultimate goal of making it usable on the Amateur Radio 10 meter band - 28 - 29.7 MHz. This is the kind of technological innovation that can only occur in Amateur Radio from a passionate idea, patient development and of course trying to take advantage of current technology. I noted VE3XTV stating:

> But still do not have the required processing power needed with my i7 PC…

I can't imagine that will be the case much longer. For example, benchmarks for Apple's brand new base Mac Mini that include the new Apple M4 processor are pretty impressive. The base M4 includes 10 CPU cores and 10 GPU cores, and its list price is $6006. Yes, it's hard / rare for Amateur Radio developers to build apps for Apple devices, and that's a $600 computer to dedicate to a single function… but within a few years, that level of performance will be available in less expensive PCs (now that Microsoft is doing a decent job of Windows running natively on ARM processors)… and perhaps even a Raspberry Pi 6 in a few years with an improvement over Raspberry Pi 5's processor that has 4 cores.

International Space Station (ISS) Slow Scan TV (SSTV) Experiment 2024-11-18 thru 24

Clint Bradford K6LCS on the Work-Sat email list:

> Receiving and decoding these images can be as simple as holding up your HT with stock antenna to your smart phone with a three dollar app! Here's the details…
>
> https://www.work-sat.com/sstv.html

SSTV Experiment Upcoming
Expedition 72 - ARISS Series 22 SSTV Experiment
Runs November 11 to 18, 2024
Experiment Notes:
• On the ISS: Service Module Radio Call Sign: RSØISS
• Frequency: 145.800 MHz
• Mode: PD120
• Theme: 40 Years of Amateur Radio in Human Spaceflight
• Schedule Notes
Start times TBD. Interruption planned for scheduled contacts on Nov. 15 and 16
• Images Requested: Send your decoded images to ARISS and apply for an award at our updated gallery: https://ariss-usa.org/ARISS_SSTV/
Watch ARISS Social Media (@ariss_intl) for official updates.
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11
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SAMPLE
ARISS

These kinds of easy receive projects (no license required) are an easy, low-cost way to expose and promote some of the more interesting aspects of Amateur Radio.

Reliably Differentiating Between Two (or More) USB Audio Interfaces on the Same Computer

Adam White K4SPB on the DRA-Sound-Cards email list:

> **Changing PID when running dual DRAs**
>
> I've built a packet node with two DRA36Ms and direwolf does not like the matching PIDs of the two cards when trying to find PTT GPIOs. I've posted a question to their group here because there's supposed to be a way to enumerate them in the .conf. My question to this group is does anyone know a way to change the PID of one or both of these cards?

The subtext is that the DRA (Digital Radio Adapter) series of audio interfaces are USB devices, and thus when the computer is rebooted or power cycled, if there is no “differentiation” of two identical USB devices, the order in which USB devices are enumerated by the USB system can change and thus a DRA connected to

“Radio A” can, frustratingly, end up being enumerated as the DRA connected to “Radio B”.

I’ve experienced a similar issue when attempting to use multiple (inexpensive) USB to RS-232 adapters on the same computer. I was only able to solve that issue by using a USB to 4-port RS-232 adapter, and later a (surplus, thus inexpensive) USB to 16-port RS-232 adapter.

Thus I found this multi-message exchange of explanations and techniques on this topic to be interesting and informative.

Fall 2024 Husky Satellite Lab (HSL) Update

> The big news: we’ve been accepted into the University Nanosatellite Program (UNP)! This prestigious program comes with over a quarter million dollars in funding (wow we’re rich!), which will significantly boost our work on HuskySat-2. With this support, we’re not only advancing our technical goals but also enhancing HSL’s visibility and appeal to potential sponsors.
>
> To support these growing needs, we’re establishing a business subteam soon. This team will handle essential administrative and non-technical tasks, including finances, outreach, public relations, and more. We’re excited to see how this team helps us connect with our community and manage our resources even more effectively.
>
> …
>
> **Communications Subsystem**
>
> Nick Gutierrez, a lead engineer at Apex Space, generously donated two Endurosat S-Band radios and a Nuand BladeRF Micro A4 to the Husky Satellite Lab, a contribution worth over $28,000. In addition to this hardware support, Nick has also offered monthly mentorship to the communications team, which is an invaluable resource for their development.
>
> The team is currently setting up these new radios, ordering a PyCubed system, and completing assembly of an adapted OpenLST radio. Leadership has also shifted, with Evan Gubarev taking over from Marcin Anforowicz as the new communications lead, bringing enthusiasm and a background in radio tech. The team’s goal now is to get a radio fully operational to enhance HuskySat-2’s communications capabilities.

I’m looking forward to learning more about what kind of radio communication experiments will be attempted on HuskySat-2 based on these new Software Defined Radio units.

Husky is the mascot name of the University of Washington (Seattle, Washington, USA). HSL’s first satellite, HuskySat-1, was deployed from the International Space Station into (very) low earth orbit on 2020-01-31 and its mission was deemed to be complete on 2020-06-01. There was Amateur Radio involvement in the HSL program:

> The HS-1 also flew a newly developed amateur radio linear transponder developed by AMSAT, aimed at contributing to the worldwide communication networks built and operated by ham radio enthusiasts.

During the brief life of HuskySat-1, I was in the midst of packing up our home of 30+ years in the Seattle area, thus I wasn’t able to attempt communications via it. But with HuskySat-2 in the “serious development” stage, I really need to get going on a basic satellite station for Amateur Radio (and other experimental) satellites in Low Earth Orbit. Note to self - start by ordering an EggNOGS antenna.

Pioneering the Future with Wi-Fi 8

White Paper from MediaTek Filogic:

> The forthcoming Wi-Fi 8 aims to prioritize a pivotal aspect of wireless communication that has become increasingly critical: reliability. Recognizing the ever-growing quest for reliable wireless connectivity, the IEEE 802.11 Working Group has designated Wi-Fi 8 for Ultra High Reliability (UHR) and has formed the Task Group bn to spearhead this development.
>
> Industry experts from around the globe are contributing a wealth of potential features to this endeavor. MediaTek Filogic, as an active spec contributor and leading product provider for Wi-Fi solutions, is excited to share its technological vision through a series of white papers. These documents will dissect the myriad features under consideration, organized into four key categories:
>
> 1. Fast: Strategies to enhance the data throughput between access points (APs) and stations.
> 2. Reliable: Methods to bolster the reliability of wireless services.
> 3. Always-on Connected: Techniques to minimize service interruptions and maintain constant connectivity.
> 4. Beyond Wi-Fi 8: A look at the ongoing efforts to improve Wi-Fi services that fall outside the scope of the 802.11bn standard. This includes, but is not limited to, topics such as Integrated Millimeter Wave (IMMW) and Artificial Intelligence and Machine Learning (AIML).

This is an interesting glimpse into the incredibly fast-evolving Wi-Fi ecosystem; I'm not even up to speed on *Wi-Fi 7*. I'm glad that the maniacal focus on *speed, **faster** speeds* has now turned towards improving the reliability of Wi-Fi connectivity. 60 GHz is now feasible for consumer use and I hope that it will be integrated into a future Wi-Fi specification.

APRS Local Info Initiative

Great writeup by John Langner WB2OSZ of the APRS Foundation on this existing (but largely unrealized) concept of APRS from its very early days:

> The APRS Local Info Initiative aims to leverage the Automatic Packet Reporting System (APRS) to provide local information to users.
>
> This initiative is designed to create a network of APRS users who share information about their communities, such as resources, local events, weather conditions, and emergencies.
>
> How it works:
>
> - Broadcasting information: APRS users can broadcast messages containing local information, which can be received by other APRS users in the area.
> - Receiving information: APRS users can set up their receivers to automatically receive and display local information broadcasts.
> - Sharing resources: The initiative encourages users to share resources, such as maps, data, and software, to enhance the capabilities of the APRS local information network.

Link to Bob Bruninga WB4APR's original writeup of this idea - http://aprs.org/localinfo.html

I really hope this initiative from APRS Foundation to modernize this capability gets some significant takeup from the APRS community. Like APRS messaging, Local Info is one of the most powerful, but unrealized existing capabilities of APRS that if realized, would be a superpower capability for Amateur Radio.

One such capability I hope to discuss and experiment with in the near future (deferred way too long now) is

“file streaming” that is possible using FLAMP - a radio channel dedicated to streaming various files that are useful and interesting to local Amateur Radio Operators - repeater directories, callsigns of all local Amateur Radio Operators, club meetings and other events, lists of useful websites, articles about local Amateur Radio clubs, lists of individual Amateur Radio operators with special interests such as space communications, etc. APRS Local Info broadcasts could provide some “light” information, including pointers to the “FLAMP channel”.

Kudos to WB2OSZ for starting this conversation!

Open Research Institute (ORI) Inner Circle Newsletter: Autumn 2024

Includes updates on ORI projects:

- Ribbit Radio (Rattlegram)
- Opulent Voice Comes to the PLUTO SDR
- Regulatory Work at ORI (report on the recent videoconference regarding 219-220 MHz)
- Recent in-person conferences attended by ORI folks.

Good, detailed report-out from ORI; it’s a Zero Retries Interesting read.

Surrey Amateur Radio Communications Communicator Newsletterzine - November - December 2024

The link above allows you to read it online like a magazine. If you’d prefer a PDF, click this link.

As always, high praise for a well-edited Amateur Radio publication that’s made available online for free to a worldwide audience. At 130 pages this issue, it’s a delight to read and browse in multiple sessions.

There are plenty of good, interesting articles and columns, including a few that are Zero Retries Interesting, which is all I could ask for in a “general interest” Amateur Radio publication. In my opinion, The Communicator’s content, layout, etc. (in all aspects) is the equal of publications such as QST, RadCom, CQ (RIP), etc.

I really gotta get myself up to Surrey, British Columbia, Canada for one of their meetings and meet at least some of these very capable and interesting folks in person.

Leave a comment

Share

Join the *Fun* on Amateur Radio

If you’re not yet licensed as an Amateur Radio Operator, and would like to join the fun by *literally having a license to experiment with radio technology*, check out
Join the Fun on Amateur Radio for some pointers.

Zero Retries Frequently Asked Questions (FAQs) — In development 2023-02.

Closing the Channel

In its mission to highlight technological innovation in Amateur Radio, promote Amateur Radio to techies as a literal license to experiment with radio technology, and make Amateur Radio more relevant to society in the 2020s and beyond, Zero Retries is published via email and web, and is available to everyone at no cost. Zero Retries is proud *not to participate* in the Amateur Radio Publishing Industrial Complex, which hides Amateur Radio content behind paywalls.

My ongoing ***Thanks*** to:

- Tina Stroh KD7WSF for, well, *everything!*

- ***Annual Founding Members*** **who generously support Zero Retries financially:**
  Founding Member 0000 - Steven Davidson K3FZT (Renewed 2024)

  Founding Member 0001 - Randy Smith WU2S (Renewed 2024)
  Founding Member 0002 - Chris Osburn KD7DVD (Renewed 2024)
  Founding Member 0003 - Don Rotolo N2IRZ (Renewed 2024)
  Founding Member 0004 - William Arcand W1WRA (Renewed 2024)
  Founding Member 0006 - Todd Willey KQ4FID (Renewed 2024)
  Founding Member 0007 - Merik Karman VK1DF / VK2MKZ (Renewed 2024 *with two Founding Member subscriptions!*)
  Founding Member 0008 - Prefers to Remain Anonymous 14 (Renewed 2024)
  Founding Member 0009 - Prefers to Remain Anonymous 19
  Founding Member 0011 - Rick Prelinger W6XBE (New 2024)
  Founding Member 0012 - Ryan Tolboom N2BP (New 2024)

- Numerous Annual and Monthly subscribers who also generously support Zero Retries financially!

Want to Support Zero Retries?

- The *most* effective way to support Zero Retries is to simply mention Zero Retries to your co-conspirators that are also interested in knowing more about technological innovation that is occurring in Amateur Radio and encourage them to become a fellow subscriber.

- One particularly effective method of promoting Zero Retries is to add a mention of Zero Retries to your QRZ page (or other web presence) and include a link:

  https://www.zeroretries.org

- If you'd like to financially support Zero Retries, becoming a paid subscriber is *greatly* appreciated and helps offset expenses incurred in publishing Zero Retries. Paid subscriptions for Zero Retries are *entirely optional*, as explained in this special issue of ZR:
  Zero Retries Administrivia - Activating Payment Options.

These blogs and newsletters regularly feature Zero Retries Interesting content:

- Dan Romanchik KB6NU mentions "Zero Retries Interesting" topics so regularly on his blog (that I otherwise wouldn't know about) that I've bestowed on him the honorific of Pseudostaffer.

- Jeff Davis KE9V also mentions "Zero Retries Interesting" topics so regularly on his blog (that I otherwise wouldn't know about) that I've bestowed on him the honorific of Pseudostaffer.

- Amateur Radio Weekly by Cale Mooth K4HCK is a weekly anthology of links to interesting Amateur Radio stories that often feature "Zero Retires Interesting" topics.

- Experimental Radio News by Bennet Z. Kobb AK4AV discusses (in detail) Experimental (Part 5) licenses issued by the US FCC. It's a *must-read-now* for me!

- RTL-SDR Blog - *Excellent* coverage of Software Defined Radio units.

- TAPR Packet Status Register has been published continuously since 1982.
- Hot Iron - The Journal of the Constructor's Club is a delightful quarterly newsletter.
- Other Substack Amateur Radio newsletters recommended by Zero Retries.

These YouTube channels regularly feature Zero Retries Interesting content:

- HB9BLA Wireless by Andreas Spiess HB9BLA
- KM6LYW Radio by Craig Lamparter KM6LYW (home of the DigiPi project)
- Modern Ham by Billy Penley KN4MKB
- Tech Minds by Matthew Miller M0DQW

These podcasts regularly feature Zero Retries Interesting content:

- Store and Forward - a podcast about the past and future of amateur radio, by Kay Savetz K6KJN (curator of the Digital Library of Amateur Radio and Communications) and Steve Stroh N8GNJ (Editor of Zero Retries).
- Ham Radio Workbench by George Zafiropoulos KJ6VU (and friends)
- Foundations of Amateur Radio by Onno Benschop VK6FLAB

If you're reading this issue on the web and you'd like to see Zero Retries in your email Inbox every Friday afternoon, just click below to join ***2200+*** other subscribers:

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If you're a fellow smart person that uses **RSS**, there *is* an **RSS feed for Zero Retries**.

Social Media:

Zero Retries (N8GNJ) is on Mastodon — n8gnj@mastodon.radio — just click:

Zero Retries / N8GNJ on Mastodon

Zero Retries (N8GNJ) is also on Bluesky — @n8gnj — just click:

Zero Retries / N8GNJ on Bluesky

Email issues of Zero Retries are "instrumented" by Substack to gather basic statistics about opens, clicking links, etc.

More bits from Steve Stroh N8GNJ:

- **SuperPacket blog** — *Discussing new generations of Amateur Radio Data Communications - beyond Packet Radio (a precursor to Zero Retries)*

- **N8GNJ blog** — *Amateur Radio Station N8GNJ and the mad science experiments at N8GNJ Labs in Bellingham, Washington, USA*

Thanks for reading!
Steve Stroh N8GNJ / WRPS598 (He / Him / His)
These bits were handcrafted (by a mere human, not an Artificial Intelligence bot) in beautiful Bellingham (The City of Subdued Excitement), Washington, USA, and linked to the Internet via **Starlink *Satellite* Internet Access**.

2024-11-08

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Footnotes for this Issue

1

The traditional arrangement of the FCC being composed of two Democrat Commissioners, two Republican Commissioners, and the Chair being the same party as the current administration is a "norm" or merely just tradition. If there is one thing we have learned in the past eight years, "norms" aren't laws or regulations, and thus may not be continued.

2

In my mind, in my world, I would *think very highly* of any company who had the savvy to be a significant sponsor of The Communicator given that it's serving the role of a free, good, worldwide Amateur Radio publication that is an easy read to get some idea of what Amateur Radio is about.

3

Yes, *I have been encouraging N2IRZ to resume writing his Digital Connection column*, either here in Zero Retries, or in The Communicator. He's consistently told me "he's thinking about it".

4

aprssig, sponsored by TAPR, remains the primary worldwide online community for APRS development.

5

Here I am lumping together any digital voice system for two way radio that effectively requires the use of proprietary technology such as the "DVSI CODEC chip".

6

Note to self - I might want to purchase a new Mac mini before the made in China tariffs are imposed.